WE CLAIM:

1. A method of inhibiting atrophy in skeletal muscle cells comprising treating the cells with an inhibitor of the Ras/Raf/Mek/Erk pathway.

2. The method of Claim 1 wherein the inhibitor inhibits Ras.

3. The method of Claim 1 wherein the inhibitor inhibits Raf.

4. The method of Claim 1 wherein the inhibitor inhibits Mek.

5. The method of Claim 1 wherein the inhibitor inhibits Erk.

6. The method of Claim 1 wherein the inhibitor is PD98059 or farnesyl transferase.

7. A method of identifying an agent that inhibits atrophy in skeletal muscle cells comprising:

(a) preparing muscle cells that express constitutively active mutant forms Ras/Raf/Mek/Erk;

(b) subjecting the cells to a test agent;

(c) measuring the amount of atrophy in the muscle cells subjected to a test agent;

(d) comparing the amount of atrophy in the muscle cells subjected to a test agent with the amount of atrophy in untreated transgenic muscle cells of step (a), wherein a smaller amount of atrophy in the muscle cells subjected to a test agent indicates that the agent inhibits the Ras/Raf/Mek/Erk pathway and therefore inhibits atrophy in muscle cells.

8. The method of Claim 7 wherein the measuring utilizes muscle cell diameter, protein amount, p70S6 kinase activation or Phas-1 activation.

9. The method of Claim 7 wherein the measuring utilizes measuring inhibition of Ras/Raf/Mek/Erk.

10. The method of Claim 7 wherein the muscle cells are cultured cells.

11. The method of Claim 10 wherein the cultured cells are myoblasts.

12. The method of Claim 11 wherein the myoblasts are C2C12 cells.

13. The method of Claim 11 wherein the myoblasts are differentiated myoblasts.

14. The method of Claim 13 wherein the differentiated myoblasts are myotubes.

15. The method of Claim 7 wherein the muscle cells are obtained from a transgenic organism.

16. The method of Claim 7 wherein the muscle cells are within a transgenic organism.

17. The method of Claim 15 wherein the transgenic organism is a transgenic fly, worm, bird, chicken, turkey, mouse, rat, dog, cat, rabbit, sheep, pig, goat or horse.

18. The method of Claim 16 wherein the transgenic organism is a transgenic transgenic fly, worm, bird, chicken, turkey, mouse, rat, dog, cat, rabbit, sheep, pig, goat or horse.

19. A method of identifying an agent that inhibits atrophy in muscle cells comprising:

a) measuring the activation of the Ras/Raf/Mek/Erk pathway in untreated muscle cells,

b) subjecting the muscle cells that express the Ras/Raf/Mek/Erk pathway to a test agent,

c) measuring the amount of Ras/Raf/Mek/Erk activity in the muscle cells subjected to a test agent;

d) comparing the amount of Ras/Raf/Mek/Erk activity in the muscle cells subjected to a test agent with the amount in the untreated muscle cells, whereby a larger amount in the muscle cells treated with a test agent indicates that the agent inhibits the Ras/Raf/Mek/Erk pathway and therefore inhibits atrophy in muscle cells.

20. A method of identifying a gene encoding a gene product that inhibits skeletal muscle atrophy comprising:

(a) preparing muscle cells that express constitutively active mutant forms Ras/Raf/Mek/Erk;

(b) introducing into the cells of (a) a test gene under conditions in which the test gene encodes a product;

(c) measuring the amount of atrophy in the test-gene encoding muscle cells; and

(d) comparing the amount of atrophy in the test-gene encoding cells with the amount of atrophy in the muscle cells of step (a) in which the test gene has not been introduced, wherein a smaller

amount of atrophy in the test gene-encoding muscle cells indicates that the test gene product inhibits the Ras/Raf/Mek/Erk pathway and therefore inhibits atrophy in muscle cells.

21. The method of Claim 20 wherein the measuring utilizes muscle cell diameter, protein amount, p70S6 kinase activation or Phas-1 activation.

22. The method of Claim 20 wherein the muscle cells are cultured cells.

23. The method of Claim 22 wherein the cultured cells are myoblasts.

24. The method of Claim 23 wherein the myoblasts are differentiated myoblasts.

25. The method of Claim 20 wherein the muscle cells are obtained from a transgenic organism.

26. The method of Claim 20 wherein the muscle cells are within a transgenic organism.

27. The method of Claim 25 wherein the transgenic organism is a transgenic fly, worm, bird, chicken, turkey, mouse, rat, dog, cat, rabbit, sheep, pig, goat or horse.

28. The method of Claim 26 wherein the transgenic organism is a transgenic fly, worm, bird, chicken, turkey, mouse, rat, dog, cat, rabbit, sheep, pig, goat or horse.

29. A method of inhibiting atrophy in a vertebrate animal having an atrophy-inducing condition comprising treating the vertebrate animal with an effective amount of an inhibitor of Ras, Raf, Mek or Erk.

30. The method of Claim 29 wherein the vertebrate animal is a chicken, rodent, rabbit, dog, cat, cow, horse, pig, sheep, primate or human.

31. The method of Claim 29 wherein the vertebrate animal is treated prior to exposure to or onset of the atrophy-inducing condition.

32. The method of Claim 29 wherein the atrophy-inducing condition is immobilization.

33. The method of Claim 29 wherein the atrophy-inducing condition is denervation, starvation, nutritional deficiency, metabolic stress, diabetes, aging, muscular dystrophy or myopathy.

34. A method of causing muscle hypertrophy in skeletal muscle cells comprising treating the cells with an inhibitor of the Ras/Raf/Mek/Erk pathway.

35. The method of Claim 34 wherein the inhibitor inhibits Ras.

36. The method of Claim 34 wherein the inhibitor inhibits Raf.

37. The method of Claim 34 wherein the inhibitor inhibits Mek.

38. The method of Claim 34 wherein the inhibitor inhibits Erk.

39. The method of Claim 34 wherein the inhibitor is PD98059 or farnesyl transferase.

40. The method of Claim 34 wherein the muscle cells are within a vertebrate animal.

41. The method of Claim 40 wherein the vertebrate animal is a chicken, rodent, rabbit, dog, cat, cow, horse, pig, sheep, primate or human.